AN

INTRODUCTORY LECTURE

TO THE

Medical Classes

IN

KING'S COLLEGE, LONDON.

BY

HERBERT MAYO, F.R.S. F.G.S.

PROFESSOR OF ANATOMY, SURGEON TO THE MIDDLESEX HOSPITAL, &c.

Read, October 1, 1834.

LONDON:

BURGESS AND HILL, GREAT WINDMILL STREET.

1834.

CHARLES WOOD AND SON, PRINTERS,
Poppin's Court, Fleet Street.

AN

INTRODUCTORY LECTURE,

&c. &c. &c.

Mr. Principal and Gentlemen,

Those, whose attention has been directed to the subject, will not fail to have observed the great improvements which have taken place in medical education in England during the last ten or fifteen years. Within that period, several useful alterations have been introduced into the methods of instruction followed by medical teachers, and by physicians and surgeons to hospitals; the information conveyed in lectures has been rendered more complete, precise, and accurate; and the professional attainments of our pupils have reached a higher standard.

The causes, which have principally contributed to bring about these improvements, are the following. Since the commencement of the present century, important additions have been made to medical science. Anatomy, physiology, and pathological anatomy, have been greatly enlarged; the latter branch of study more especially, and to an extent, which, combined with the juster views which now prevail in physiology, has given

a new tone to the medical art, and impressed upon its studies a truly philosophical character. The indolent have no longer the excuse, that professional science does not manifestly contribute to professional skill; while the best spirits among our pupils have caught the impulse to severer study, and thirst after those springs of knowledge which are now opened for their use.

To favour these higher aspirations of our pupils, a change originating in other circumstances has taken place in the position of the teacher. Till within the last ten or fifteen years, the schools of medicine in London had not risen above the character of private tuition. The anatomical theatre and museum had used to belong to the lecturer, who held and disposed of them as his private property. The student about to attend lectures, made himself the pupil, not of a school, but of this or that individual, of whose competency to teach he surrendered his right to judge, on becoming his pupil. At present the lecturer, in the larger and better schools, holds his office on a different tenure. His appointment is not obtained by purchase or inheritance: he is elected on the presumption that he is thoroughly qualified for his professorship, for the proper discharge of the duties of which he is answerable to public opinion, to those who appointed him, to those whom he undertakes to instruct.

There is but one evil to be feared from this change in the relative situation of the teacher and pupil; I allude to the tone of cavilling and hasty censure, which the student, raised to be a judge over his teacher, is perhaps too naturally tempted to indulge in. This evil, indeed, has not been felt *with us;* and I should not advert to it, but that the baneful influence of the worst part of the press has been at work to foster this spirit, and to send

the student to our schools prepared to blame rather than to approve, disposed to look for defects, to distrust the possibility of excellence. I do not indeed fear, that even were this bad seed sown among us, its influence could long prevail. Other and opposite feelings would quickly spring up among the best inclined and the diligent. The obvious wish of the teacher for the improvement of his pupils, and his zeal for their advancement, would soon compel a grateful observance. But esteem thus growing upon judgment, how indifferent a substitute is it for the enthusiasm which precedes it; for those feelings of affectionate and mutual confidence, of which, under the former system, the prevalence was universal; which, on the one hand, added new warmth and spirit to the lecture, and, on the other, excited and kept alive attention; which placed the pupil and his teacher on a footing, so much to be desired and encouraged, — the commencement of friendship, kept up through life by the interchange of reciprocal good offices. I trust, that, in this place, where the evil disposition to which I have adverted has found no footing, I trust that here, the excellences of each system may continue to be combined; and that the intellectual activity and emulation after knowledge of the present day may be obtained, without the sacrifice of the more generous and better tone, which characterized the periods we look back upon.

We have already entered upon a new era; but the changes which we have witnessed are but preliminary to greater. The institutions of our profession, containing much of practical good, gradually shaped by and upon the immediate wants of society, and which have produced a succession of physicians and surgeons, whose general attainments and scientific discoveries and moral worth have been honourable to our country, are never-

theless in theory imperfect, and unquestionably would admit of large improvements.

There has indeed been already evinced a great disposition, on the part of our public medical bodies, to correct the more obvious faults of the present system. This spirit of improvement working in our profession, but unequally in different parts, has at length drawn to it the attention of the legislature. It is well known, that a statesman to whom the public is very greatly indebted for digesting and bringing into parliament the anatomical bill, has originated a committee of inquiry into the state of the medical institutions of the country. The good which Mr. Warburton has already done, gives earnest that the result of his present labours will be beneficial to the community. This topic has such recent and pressing interest, that I have felt greatly tempted to enter upon it, and to lead you, in this Lecture, to the consideration of the changes which might with most prospect of benefit be introduced into our profession. But I have recollected, that those to whom this Lecture is particularly addressed are, of our whole profession, the least interested in their discussion. So far advanced as *students*, no change in the prescribed course of education will affect *you:* so young as *members* of our profession, it will be long before you are called upon to exercise your judgment in modifying its institutions.

Instead therefore of discussing what alterations require to be made in our medical establishments, I will endeavour to lay down — addressing you as persons having at present nearly a free choice as to your studies, and almost unfettered as to the nature and order of your pursuits — what course of education would be the best for a medical student; what the intellectual discipline, what the attainments and course and character of study, the

adoption of which would render a physician or surgeon most accomplished for the duties of his profession.

Of these attainments, there are some which are commonly made at a period of life, which those whom I now address have passed; and if there are any present who have neglected them, to such my strong recommendation of their pursuit may appear to come too late. Let not any one, however, give way to this impression, and abandon the hope of recovering the neglected acquirements of early youth. Where there is a determined will, nothing is so readily retrieved as Time. Those only bewail its past misemployment, who lack vigour to use the present. It is well always to remember, that education is not limited to the few years of youth; but that the whole of life, when properly employed, is one continued course of mental improvement: and that although one order of acquirement may be better than another, and different seasons of life peculiarly adapted for different kinds of study, in its course breaks and intervals continually occur, when unemployed opportunities may be redeemed, and neglected studies resumed.

The acquirements, to which I am disposed to assign the first place, are a knowledge of the classical languages of antiquity, and an acquaintance with classical literature. It is the tone with some at the present day to undervalue these attainments, which hitherto have constituted the basis of what has been emphatically called a *liberal education*, to consider the reverence entertained by many for them, as a prejudice which is on the eve of being dispelled, and to recommend in their place the adoption of studies of more *practical* utility. For my own part, I am willing to argue the value of these studies, on the ground of their usefulness alone.

As language is the instrument of thought, the basis of

intellectual education should be the mastery of language. *One* language, it is true, rich and various as our own, should be sufficient to contain and express each element of human learning and thought. But it happens, that our native language, a compound of several tongues, is borrowed to so great an extent from the Latin, that its force and meaning, nay its construction, cannot be perfectly mastered, without a knowledge of that language at the least. I do not advert to terms of science, when asserting that the English language is imperfectly understood by the mere English student. These, derived principally from the Greek, it is evident must appear to *him* a barbarous and difficult, as well as an unmeaning nomenclature. But almost all our general and abstract terms have a Latin etymology; and their spirit cannot be perfectly caught, unless the language in which they were formed is known, in which the transition was made from sensible images to general expressions.

Experience will likewise bear me out, that, with hardly an exception, correctness in English writing has been attained by those only who have enjoyed some acquaintance with the classical languages: while the converse is remarkable, that well-educated foreigners have often succeeded in writing our language with purity and elegance.

His native tongue, however, is not the only one, which, in the most strictly practical view, is essential to the English medical student. He can hardly proceed a step *with certainty* in his professional studies, without a knowledge of French and Italian. Let him address himself to the study of these languages upon a previous acquaintance with English alone, they seem strange, arbitrary, and in proportion difficult: give him Latin, the common principles of these languages and of his own are clear to him:

what seemed arbitrary vanishes; and the analogies which he discovers give interest to the study, and render the acquisition easy.

What is true of the language of the Continent, is no less true of its literature; both borrow from the same originals. The best literature of modern Europe, is drawn more or less from the classic sources, and cast in the classic mould; and can neither be felt nor valued as it ought, without ascending to the fountain head.

But if the languages of Greece and Rome are indirectly valuable for the light which they throw upon our own and upon other modern languages, and if they are necessary to elucidate modern literature, still more are they valuable in themselves, for the treasures which they enshrine, of history, philosophy, poetry. How useful, how grateful a resource is it, amidst the harassing cares and various solicitudes inseparable from a professional life, to turn from perplexed thoughts to classic lore, to forget at once and to recruit one's wearied spirits amid its noble images and lofty lessons. It is a first impulse of instinct, to acquire one's native tongue,—the first and natural employment of the first awakened faculty of the mind,—that we may learn to hold converse with the living. It is not less the first impulse of reason, to extend the use of the same faculty to acquiring the languages of the dead; to possessing ourselves of the keys of the tomb in which antiquity is embalmed; of those grander and more lasting than Egyptian monuments, in which, not the shrunken form and lineaments of nations are preserved, but their wisdom and their wit, their inspiration and their genius, still breathe in "thoughts that speak and words that burn."

There is another application of classical learning, the

exposition of which I shall borrow from Professor Sedgwick's admirable discourse on the studies of Cambridge.

"It is I think certain," says Professor Sedgwick, "that the study of an *ethical* system, grounded on the moral and social feelings, and exemplified by that course of action which in all ages has been honoured by the virtuous and the wise, is not only a good practical training for the mind, but prepares it for the acceptance of religious truth. Whether this opinion be true or false, it is at least certain, that many of the writers of antiquity had correct notions on the subject of natural religion. The argument for the being of a God, derived from final causes, is as well stated in the conversations of Socrates as in the Natural Theology of Paley. Nor does Socrates merely regard God as a powerful first cause, but as a provident and benevolent being; and he tells us, that, as man is the only animal with a soul capable of apprehending a God, he is the only being by whom God is worshipped: that prayer and sacrifice are our duty: that by such services we may learn some of the secrets concealed from men; and know that the Divinity sees every thing, hears every thing, is present every where, and cares for all his works."

Of the salutary influence upon the mind, which these anticipations of religious truths in ancient literature produce, no doubt can be entertained. I would even, yet I feel that it is presumptuous, additionally remark, that there are some youthful minds, and those of the most vigorous cast, which find something especially congenial in the purest system of ancient morality. There are minds, in which the sternness and grandeur of the best philosophy of antiquity find a responsive echo; and

whose Christian principles are collaterally strengthened by the lessons, which bid the student,

> Fortem posce animum, et mortis terrore carentem ;
> Qui spatium vitæ extremum inter munera ponat
> Naturæ ; qui ferre queat quoscunque labores ;
> Nesciat irasci ; cupiat nihil ; et potiores
> Herculis ærumnas credat, sævosque labores,
> Et Venere, et cænis, et plumis Sardanapali.

It admits of a question, to what extent mathematical studies should form a part of medical education. Pure and mixed mathematics, the method of analysis, and its application to natural philosophy, constitute indeed the fairest triumph of human reason. The greatest intellect, that ever rose above humanity, found in these studies, and in the order of nature which they served to elucidate, the single subject worthy its genius. But mathematical studies have no direct application to medicine; and if a time is to come, when physiology shall rank among the exact sciences, that period is certainly very distant. To the medical student, mathematical studies may seem therefore to have little value, except as an exercise and discipline of the understanding. It has been thought by some that their value even in this respect is equivocal; and it has been argued, not without plausibility, that the habit of looking for demonstration unfits the intellect for weighing moral truth ; and that in proportion as the mind is accustomed to absolute certainty in every step of reasoning, in so far does its power of estimating probability suffer by disuse; while a distaste is acquired for any study, to which demonstration does not apply.

If such (but I will not assert it to be so) is the tendency of mathematical studies, it can only operate when they are long and exclusively pursued ; and the objection, if then just, does not apply to the ordinary scale of attainment.

And certain it is, that, indirectly, some acquaintance with mathematics is essential to the physician or surgeon, as connected with or illustrating other studies, which are important branches of his education. These subjects are natural and intellectual philosophy.

Some knowledge of the former is essential in physiology. The student is to be prepared, not to view the eye as a jelly which sees, but to comprehend all the wonderful purposes attained by its perfect and delicate structure. The windpipe he is to consider as something more than an intricate little part, with muscles and cartilages; and he must learn to understand the fitness of the means, which it contains, for producing that exquisite source of modulated expression, the human voice. But the eye would be an unintelligible puzzle to him without a knowledge of optics; the larynx a toy for childish wonder, without the science of acoustics. In like manner would he be blind to the beautiful adaptations in the skeleton without some knowledge of mechanics. It may perhaps be said, that no profound knowledge of natural or experimental philosophy is required to enable the student to comprehend all (upon which they bear) that has yet been ascertained in physiology; but for that little, for the elementary views which are absolutely requisite, the student must possess at least an elementary acquaintance with mathematics.

The student will not have proceeded far in investigating the wonders which natural philosophy unfolds, without falling back in reflection upon the mental powers which he has learnt to use, and which have brought to light the facts which have awakened his curiosity. Are these surprising phenomena, is this philosophical harmony, reality, or but a fiction of the imagination? What is truth? — is the startling question which forces itself upon his thoughts. What are the laws of

belief? What are the powers of discovery and invention with which the mind is gifted? What are the necessary limits of human knowledge? As he disentangles his perplexed thoughts upon these questions, each element of his intelleetual nature becomes distinct before him: the conceptions of the infinity of spaee, of eternity, of efficient causation, of an external Nature, which the Deity has stamped on his conviction,—the source and singleness and exclusive character of demonstration, — the nature of probable evidence,—the force of analogy,—the method and conclusiveness of induction, — stand out in relief before him. We may suppose, that in following up these interesting speculations, he continually reverts to his knowledge of natural philosophy; or that, varying the theme, he draws his illustrations of analogical reasoning from the moral world, and exemplifies induction in physies.

He may now make a step. The studies, which he has hitherto pursued, are common elements of a liberal edueation and of his especial pursuits. A branch of knowledge next presents itself, which stands intermediately between those already considered, and studies purely medical, useful it may be, when forming part of a liberal education, essential, if the bent of subsequent aequirement is to partake of a scientific character.

We will suppose that the latest inquiries of our imaginary pupil have acquainted him with the most general truths of natural philosophy. The infinity of space is to his thoughts peopled with suns, the centre each of a system, which it bears along through space; — the sun that shines on us, the support of the visible world of planets; — the earth among the meanest, performing its prescribed revolutions; — the moon swinging round it, held by the same eternal chain; — the pressure and force of the elastic fluid which envelopes the earth; — the down-

ward course of rivers; — the level of the ocean, disturbed only as it follows in tidal wave the moon; — the *mechanical* elements of change which are influencing the surface of our planet; — are subjects of familiar contemplation to his mind.

But a more searching glance may be thrown upon nature. The matter which forms earth, air, water, varies in a thousand shades of difference. Why is each what it seems, mutable or immutable?

Chemistry is the profound and beautiful science by which such questions are proposed and solved; in which the molecular constitution of our globe and its atmosphere is examined and determined; the different bodies which we look upon tested; whether they are simple, irreducible to other elements, like the metals; or whether, like the earths, they separate into distinct constituents; in which the forces of affinity or chemical attraction are explained, which combine or decompose, hold together or tear asunder, the elements of matter.

It is evident how large the scope and application of this science must be; the mineralogist, the geologist, proceed not a step without it; the manufacturer, who labours in a thousand arts of life, depends in each upon his knowledge of chemical principles; not less direct and important are the relations of chemistry to medical science.

As yet the physical studies of our pupil have been limited to unorganized matter and its laws. He has viewed the silent earth, but as a circling planet; its structure, but as a mineralogical problem. Let him now imagine its surface peopled; its bosom teeming with creation; its stillness changed to life; as when first, to quote Coleridge's beautiful hexameters,

'Thousandfold tribes of dwellers, impell'd by thousandfold instincts,
Filled as a dream the wide waters; the rivers sang in their channels;

Laugh'd on their shores the hoarse seas; the yearning ocean swelled upward;
Young life lowed in the meadows, the woods, and the echoing mountains,
Wandered bleating in valleys, and warbled on blossoming branches.'

These numberless tribes, whose physical nature and whose life are common to them with man,—what is their relation, as matter, to the inert globe on which they have their being? This question chemistry should answer.

To investigate it, we may take the egg, and look where life is sleeping, at that which is to form it. The yellow yelk is floating in a transparent liquid, the albumen, as it is termed. Out of that liquid the chick would have grown. What is its nature? It is susceptible of easy analysis.

Chemistry informs us, that our atmosphere is a mixture of three gases, nitrogen, oxygen, and carbonic acid, with which the vapour of water is mingled; which water itself consists of hydrogen and oxygen, as carbonic acid consists of carbon and oxygen. But this albumen, of which the chick might have been formed, contains no elements besides those which I have named; it is a compound of carbon, oxygen, nitrogen, and hydrogen. Or to take some already organized animal matter, and reduce it to its constituents, the fibre, for instance, left after boiling meat;—this is formed out of the same elements, the proportions slightly differing. Or the jelly, which boiling has separated from the fibre: it is again the same, a compound of carbon, oxygen, nitrogen, hydrogen, the proportions only again varied. Thus the matter of which living beings are framed, is chemically the same with the constituents of the organized world; but the elements being combined in new proportions, present new properties.

We obtain this knowledge analytically only; as yet no chemical synthesis has succeeded in reproducing any of the proximate elements of life.

Yet life, as far as it is physical, is certainly conducted upon chemical principles. It is a vulgar error to oppose chemistry to vitality, affinity to the force of animated organization. As philosophy advances, the properties of matter are perpetually found to be fewer and simpler; which the Creative Wisdom so combines and directs as to produce the most diversified and at first sight opposite results.

At the present period, the chemistry of organized bodies is beginning to make important progress. Changes seem to be detected in the living body, which are closely identified with chemical action, and admit of being modified by the use of agents selected on chemical principles. Our countryman, Dr. Prout, has been one of the foremost in advancing this branch of knowledge. Yet all that up to this time has been ascertained, amounts but to a crepuscular and uncertain light, the glimmer before the dawn, in which objects appear vague, uncertain, imperfectly defined; yet valuable, for the promise it affords of coming certainty.

Let us now approach the vital phenomena, the science of life itself.

We may follow, in the living egg, the changes recently discovered to take place in it, new in our philosophy, which begin when the influence of one chemical agent is made to tell. There is in the egg, resting immediately upon the yelk, a little circular disc of the thinnest membrane. Its diameter is no greater than one-sixth of an inch. It is divided into an outer zone, and an inner, clearer, and more transparent part, called the colliquamentum. This disc of membrane is

all the trace of the future chick. It is called the cicatricula, germ spot, germinal membrane, or blastoderma.

When the egg is exposed to the proper temperature, the process of development begins. Six hours after incubation has commenced, a small dark line may, with the aid of a magnifying glass, be discovered towards the centre of the transparent area. This line, which is called the primitive trace, is swollen at one extremity, and is placed in the direction of the transverse axis of the egg. The rounded end is towards the left, when the small end of the egg is turned from us.

Towards the twelfth or fourteenth hour of incubation, the germinal membrane expands itself into a larger area; and at the same time acquiring thickness, it separates into two layers. Of these, the outer is called the serous layer. The inner, in contact with the yelk, is termed the mucous. The two layers appear each to consist of coherent granules. After these two layers have appeared, a third is formed in the interval between them: this is called the vascular layer; it has a more intimate connection with the inner or mucous layer than with the outer or serous.

The primitive trace is placed in the outer or serous layer. About the eighteenth hour, two ridges are raised from the serous layer, one on either side of the primitive trace, inclosing a furrow. This furrow soon becomes closed at the swollen extremity of the primitive trace, at which part it is of a pyriform shape, being wider here than at any other part. Thus the serous layer, thickening round the primitive trace, shapes itself into the figure of a body and trunk; having absorbed from the albumen the material necessary for its growth.

In the canal formed as it has been described, a semi-

fluid matter appears, which, on its acquiring more consistency, becomes the rudiment of the spinal marrow. The same matter collects in the pyriform chamber at the top into three bladders, which are the rudiment of the brain. As the brain and spinal marrow, so are the bones, nerves, muscles, and tegumentary systems of the body, developed in the outer or serous layer.

The inner or mucous layer, folding itself while it expands, forms the rudiment of the alimentary canal.

The middle or vascular layer originates the heart and blood vessels; and, conjointly with the mucous layer, the glandular system and the lungs.

How wonderful is this process. The egg, containing its principle of development, may be kept without change for months, even for years, under proper precautions for excluding extremes of temperature, and for preventing evaporation. Expose it then to warmth, and the process of development begins. It is impossible to look for an instant into nature, without the attention being arrested by the evidence of contrivance and design, all-pervading, everywhere visible ; but in no case perhaps is that evidence so striking as the present. A transparent membrane, swelling with the warmth it is exposed to, absorbs albumen; that albumen, so absorbed, is converted into a prodigious number of distinct substances, — brain, nerve, muscle, sinew, cartilage, bone, blood-vessel, bowel, skin, beak, claws, feathers, — and that without the smallest mistake as to the quality and shaping of each; not the smallest error as to their place; a feather not placed where a bone should be, a blood-vessel where a sinew; all these parts, too, keeping a wonderful and exact proportion to each other; and disposed in such harmony, as that by the twenty-first day, at which the rapid construction of the animal body has been com-

pleted, the chick breaks the shell a perfect creature;—no colour even misplaced, true in its internal composition, true in its exterior form and marking, its species, nay the breed in that species accurately stamped; and all its feelings, instincts, appetites, to match its organization and its form.

Till recently, in the absence of direct observation, the theory of evolution was generally received: the oak was supposed to be in the acorn, the chick in the egg; and the mere increase of what was already formed seemed less astonishing. But now the wonder is demonstrable to the senses, that the slight granular membrane impressed with life, absorbs, alters, shapes, disposes, perfects! How wonderful the design, how exquisite the prescience of contrivance, which makes this slight trace of matter the first link in a necessary chain, that compels the sequence of all the other steps with measured and unerring certainty.

In whatever direction we proceed from this momentary glimpse and insight into the development of animal existence in the egg, the route is full of increasing interest. I need not say, that when you are sufficiently advanced in your studies to pursue *that* subject, you will find that alone enough amply to gratify the most eager philosophical curiosity; as already enough has been discovered in it to immortalize a school of philosophers.

But to proceed onwards:—The changes which take place in the egg may be (as oviparous production appears to be a partial phenomenon) a partial event too, and different from the order of nature elsewhere. The fact is otherwise. In that vast scope of creation, which comprehends all vertebral animals, from fish and reptiles and birds, to mammiferous animals (and to man although above them, yet partaking in their animal nature), and

even beginning much lower in the scale, near where the elements of organization have not been collected to perfect individuality, one common process, one common order invariably prevails, the same initiatory stages are gone through.

But now a new relation of these phenomena presents itself. To throw light, in medical science, upon the physical nature of man, we study with interest comparative anatomy; or, in the satisfaction of philosophic curiosity, we examine the structure of different animals, seeking in it the basis of a natural classification of the animal kingdom. In these inquiries the expression has been adopted of an ascending scale of animals, as if, in a continuous chain, the different tribes recede from or approach towards man. The correctness of this expression and idea of an ascending series of progressively improving organization is singularly manifested in the process of development in different animals. One common commencement is there for the development of all the families of vertebral animals. There is a period after its commencement, when the frame in outline being already distinct, the *class* even of the individual is indistinguishable, whether it be fish, reptile, bird, mammiferous animal, or even man. For a time, these all march parallel, alike in all things, the highest not differing from the lowest. For example:—the fish, the lowest in the scale, is formed to breathe the waters: for this purpose, in its throat there must be openings made, to give passage to the water through its gills. These openings are called branchial apertures. The reptile has no need of these openings,—but they are formed in it. In the bird they would serve no use, but they are there. In the mammiferous animal again, in man, they are useless, but they are still present. Respiratory apertures in the neck, with a single heart

and a corresponding distribution of the aorta, form the early undistinguished and undistinguishing type stamped on the whole range of vertebrata.

But now a difference begins. This character of organization is to be permanent in fish. In fish, therefore, it now expands and amplifies itself. At the corresponding period, in the higher animals, it fades, and disappears; shrinking, while a higher order of organization supersedes it, and parts are developed which in the fish appear not. This law holds throughout the economy. There is one common type for the brain at its first production, which remains permanent in the lowest tribes, but is improved upon by fresh developments in each above. Thus the brain of man at first resembles that of a fish, then of a reptile and bird: finally it becomes the mammiferous brain, then human.

How mysterious and pregnant with almost awful interest are these laws of development; which stamp so strongly upon creation the character of *one* design, proceeding from one First Cause of all.

There is a subject in medical science, which long baffled inquiry. The facts in it were reducible to no law, and threw upon Nature's operations a character of wanton deviation, of effort towards imperfection. In animal, even in human births, monstrosities are not unfrequent,—a painful study as it seemed, impugning the beneficence of Nature, or evidencing some anomalous force of impairment. The principle, however, which has been last adverted to, now brings these strange instances within the normal type, and makes them reenter the order of nature. The apparent deviation is in fact the introduction of no new element: it is but incompletion; an arrest of development. To take a remarkable instance: — There are infants born, that are livid in

colour: through their short lives the colour of the countenance and extremities remains blue. This arises from an imperfection in the heart. The two cavities of the heart,—one to hold black blood to go to the lungs, the other to hold red blood to be thrown through the body for its life and growth,—should essentially *not communicate.* But in these livid children, an opening exists in the partition between these cavities; through which the black blood of the one mixes with and contaminates the red blood in the other. This malformation is sooner or later mortal. Why should, it was asked, why should Nature in these instances wantonly perforate the septum of the heart? She does not. The fact is utterly otherwise. In the early embryo, the human heart was normally as the heart of a fish, single, it had one cavity only; afterwards an imperfect septum began to be formed in it, which is the permanent type in reptiles. The growth of this septum ought to have gone on to completion, the common type in birds and mammalia: but the force of development was feeble, and was arrested; it stopped, and failed of its purpose. Thus was there no interference to impair; but want of force, feebleness only from some accidental cause, which stopped, but did not change, the course of the prescribed order of development.

The physiological phenomena, of which I have introduced the mention, are still in some sort preliminary. They exemplify the influences, the changes, the risks, which the embryo has gone through, before it is ushered into independent existence. Creature of change till then, its subsequent physical history has the same character; but those changes, and the agencies which modify them, form the immediate subject of the varied courses of instruction which you are now preparing to enter on.

The courses of Lectures, in which the scheme of professional instruction is laid out, are the following.

To mention the anatomical lectures first,—as being the most elementary. The method pursued in these lectures is extremely simple. The different organs of which the body is composed;—the bones, joints, muscles, the brain and nerves, the heart and blood-vessels, and the rest, are taken in a natural order, and described in separate divisions of the course. The bones are the system first examined: their structure is shown, and its mechanical fitness for the purposes on which the bones are employed. The mode in which bone is originally formed in the embryo is shown, and the process of ossification explained. The changes follow which the bone naturally goes through in the different periods of life, to the decay and fragility which belongs to extreme age. The power of reparation which healthy living bones possess is next taught, and the modifications which it presents in different kinds of bone; the process of union after fracture, the circumstances which favour it, the causes which disturb it, are explained. The bones are then considered in their abnormal state. Different influences cause this system to depart from the state of perfect health and strength; some of these influences cause a bone to grow in excess, either a part or the whole; others again remove some of its composing elements, weakening its structure; or inflammation supervenes, the nature of which is shown, and of its various consequences, inflammatory enlargement of bones, abscess in bones, mortification of bones or necrosis, with the process of restoration, which is coeval with the separation of the mortified part; then caries of different kinds, either simple, or special, and locally malignant, as lupus, or dependent on peculiarity of constitution, as scrofulous or syphilitic caries, is described; finally, bones are shown to be the subject of malignant tu-

mours, of medullary sarcoma, osteo-sarcoma, scirrhus. After the nature of the bones has been explained in their general anatomy and morbid anatomy, the skeleton is demonstrated; each bone separately shown, its shape, and adaptation to the rest; its mechanical uses; the indications which it makes upon the surface of the entire and living frame; the modes in which it is liable to be injured; the diseases to which it is more especially subject.

In this manner, in the course of anatomical lectures, each organ is described in health and in disease. The course is essentially elementary; but it contains the transition from the study of natural structure to that of disease; explains the nature of diseased actions; and in reference to operative surgery, establishes the principles upon which each surgical operation is to be performed.

The student, however, it is evident would not be able to carry away from one course of lectures a sufficient recollection of the numerous facts which it unfolds. Accordingly, several hours of the day are expected to be devoted by the pupil to practically examining for himself what in the course of anatomical lectures is once only, but it is hoped fully, shown. In the anatomical museum, to which he has free access, the student may refer to the preparations which are exhibited in the lecture.

In the dissecting room, he may repeat the dissections which he has seen displayed, and carefully and repeatedly go through the whole mechanical analysis of the body. This part of the scheme of education is placed under the superintendence of my able colleague, Professor Partridge, who likewise delivers the course of anatomical demonstrations; which, according to their institution, are meant to be auxiliary, both to the lectures and to the studies of the dissecting room. In reference to the former, they are intended to repeat to the students the

expositions, which from their complexity are the most difficult to be understood, or from their practical applications, are the most important to be well remembered. In reference to the latter, the demonstrations are often made upon the dissection already prepared by the student, to whom it is a most useful lesson to hear explained by a master all the bearings of the parts he has displayed.

The next division in the scheme of instruction is the practical part. The Professors of medicine, of surgery, and of midwifery, commencing from another point of view, unfold the nature and treatment of those classes of bodily affections which fall respectively to their offices. They have indeed to refer to anatomy for the nature of disease, and for many of the principles of practice. But it is more especially with the symptoms of disease, its natural history, and external character, that the practical lecturer deals; the signs which betray the internal malady, the rules of diagnosis, the principles on which each disease is to be treated, and the remedies which are to be used for its relief, are the subjects of his lectures.

The next division is the description of the nature, and sources, and modus operandi, of the remedial agents used in medicine. The lectures on materia medica, on chemistry, on botany, may be classed, in reference to a practical education, together, under this head. It will not I am sure be supposed, that in enumerating the two latter as handmaids to medicine, I undervalue either the beautiful science of chemistry, or the history of half-animated nature which botany contains. Without both of these studies, physiology were barren; without physiology, either of these studies is singly magnificent.

Finally, the complement of our scheme of instruction, is the course of forensic medicine. The object of these

lectures is to enable the student to give judicial evidence as to the signs of intentional violence or other injury of the frame. To some this study on a narrow view may appear unimportant, except judicially. But the reverse is the fact. The subject is well worthy the attention of the physician; for it may be said to consist in learning with more accuracy than belongs to common medical knowledge, the chemical nature of deleterious agents, and their influence on the human frame, and in exercising a finer than common scrutiny into the value of morbid appearances inspected after death.

But contemporaneously with the studies, which have been described, the student has other labours. Through these various courses of lectures, and his corresponding course of reading, he may understand the nature of disease; but he has likewise to learn to *know it, when he sees it*. In the account of Cheselden's most interesting case of sight restored to one born blind, we learn, that though the patient's sight was instantaneously perfect, yet that, surrounded as he was by familiar persons and objects, he knew not one of them visually. The medical student, however well informed, if taught by lectures only, when disease is put before him, knows it no more, than Cheselden's patient knew a chair by sight. He cannot identify the occasions for applying the rules which he has learnt.

Of all the parts of a *practical* medical education, the most essential is to witness disease and to see its treatment; and the place for this study is the wards of hospitals. The most uninformed person, who should daily see a physician prescribe for the sick, would pick up the knowledge how to apply remedies judiciously in many simple cases. The student, who is only educated by lectures, cannot prescribe in one, however the knowledge he pos-

sesses may qualify him upon his commencing clinical attendance, to seize with rapidity, and promptly to comprehend the features of disease. All the time which you can spare from your lectures, should be given to hospital attendance. For this purpose, in the arrangement of the hours of lecture at King's College, a large and sufficient interval has been left in the middle of the day. Three days in the week, at least, the student should attend an hospital.

It has been said that a medical school cannot be perfect without an hospital attached to it. This statement in one sense is true. It is certain that men cannot teach medicine, surgery, or anatomy, as well as they otherwise would, unless they have the daily experience of hospital practice to give force and freshness of illustration to their lectures; and that their pupils ought to witness their practice to learn to apply their instructions. The teacher certainly should be attached to an hospital, which the student should attend. But that hospital need not abut upon the dissecting room. Its *close* vicinity is unnecessary. The great Parisian hospitals are about the same distance from the Ecole de Medicine, as the hospitals to which your Professors of medicine, forensic medicine, surgery, and anatomy belong, from King's College.

Gentlemen,

In the sketch which I have thus rapidly traced, I have endeavoured to convey an outline of those studies, which constitute the proper education of a physician or surgeon;—of one whose perfect knowledge of the science and practice of his profession will enable him to apply all its resources in the treatment of disease;—whose cultivated mind will qualify him for admission as an equal among the most favoured classes of society;—who, called

in the confidence of distress into the bosom of families, will respect the trust sacredly reposed in him; — who, called to minister to bodily pain and illness, will know how to sympathise with and to spare mental anguish; — who should be a scholar — a gentleman — a Christian; — whose lot is so fortunately cast, that all his studies may form an uninterrupted course of mental improvement, and his whole professional life be one continued act of beneficence.

It is my good fortune to be associated in a School of Medicine with colleagues, among whom no difference exists as to the proper course of medical studies and discipline of medical education. It is our common pride to form the Medical School of King's College, where it is not idle to speak of enlarged and liberal studies, but where all the branches of knowledge which I have recommended are practically attainable.

CHARLES WOOD AND SON, PRINTERS,
Poppin's Court, Fleet Street.